ABSTRACT

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Using DNA evidence in the courtroom is a practice that has increased over the last twenty years (Lieberman et al., 2008). Past research has shown that the mere presence of this scientific evidence in prosecutorial arguments increases the likelihood of a guilty verdict, even if the information has been severely mishandled (Lieberman et al., 2008). This study uses previously collected mock jury data to determine the effects, if any, mitochondrial DNA or mtDNA testimony has on a juror's perceived importance and understanding of the trial proceedings. The following also addresses the extent of group influences on the decision making process using juror thoughts regarding the verdict before and after deliberations. The study finds a positive effect between importance/understanding and the propensity to find the defendant guilty. Also, little group effects were found before and after deliberation, revealing consistency in juror thought.

EVIDENCE AND EXPECTATIONS: A LOOK INTO HOW DNA IMPACTS JURY DECISIONS IN CRIMINAL TRIALS

By

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Chapter 1: Introduction

The concept of a fair trial is the foundation upon which the American criminal justice system is built. However, one cannot help but question how fair these proceedings may actually be if those making the decisions are severely misinformed or if they are misapplying the information presented to them. The increasing use of scientific data at trial is affecting juries' ability to make informed decisions. While jury members may believe they understand scientific data when it is presented during a trial, do they really have a grasp of the significance of the information? More importantly, how do these potentially incorrect perceptions regarding scientific data influence a juror's decision-making ability?

The purpose of my research is to understand how jurors' understanding of DNA evidence can influence decision making during a trial. The use of DNA evidence in court proceedings has increased and juries are paying attention. DNA evidence has been said to have an "aura of precision", which may be strongly influencing opinions in the jury box (Schklar & Diamond, 1999, 160). While prosecutors are introducing more DNA evidence, jury members, due to this "aura of precision" have increasingly unrealistic expectations about the availability and reliability DNA evidence (T. Mauriello, personal communication, February 20, 2008). Juries have higher expectations regarding the evidence prosecutors bring to trial. I want to understand what goes into the juror's thought process and in turn, what influences their ultimate decision.

My goal is to determine if the scientific evidence presented in a case affects a juror's ability to make a reliable decision. It is important to address the concern because if jurors do not understand the complicated information presented to them during trial,

then what does go into their thought processes? Are people being persuaded by fellow group members? Are their initial thoughts about the jury from first impressions, without having heard any testimony, driving decisions? These are all questions I will address with this study. I would like to better understand what personal characteristics of a juror affects one's propensity to understand evidence. Also, I seek to determine if jury members think the information is at all important.

The factors involved in jury decision-making need to be addressed because it could determine the significance and extent of using DNA evidence in a trial. DNA evidence is understood by many lay-persons to be infallible, but it is now coming under intense scrutiny. These false pretenses are fueling the high expectations of jury members, in addition to possibly misinforming them (Mauriello, personal communication, February 20, 2008). Jurors may feel that they are learning the mechanics of DNA collection through the media sources as well as other non-academic avenues and they are bringing this "knowledge" into the courtroom, resulting in improper judgments. Also, little research has been done to understand what goes on behind the closed doors of the jury deliberation room. The process of reaching a decision in a group setting could be greatly impacting the decision making process in general. Through this study, I hope to learn more about influential decision-making factors.

Chapter 2: Understanding Jury Reliability - A Review of the Literature

Jury Decision-Making - Jury decision-making is much more complex than a guilty or not-guilty decision. In fact, there have been many studies conducted to explore what exactly happens in the deliberation room. Kalven and Zeisel (1966) revolutionized jury research by studying "The American juror". Kalven and Zeisel sought to find out how well jurors understood evidence and took a crucial first step in trying to understand jury members. Through survey data, one of their main findings was that the judge and jury agree the majority of the time regarding guilt (between 75% and 80%) (Kalven & Zeisel, 1966). A more recent study, based on the same premise, conducted by Hans & Vidmar (1986) found that this occurs 78% of the time (64% of the time with regard to guilty decisions and 14% with innocent ones) (Hans & Vidmar, 1986). There seems to be a concern about variation between the two studies, where the jury tends to be more lenient toward the defendant. Judge Frank who is cited in Hans and Vidmar's book states "we seldom know if jurors get their facts straight" (Hans & Vidmar, 1986, 115).

When deliberations are completed, jurors most often differ from each other about the case. They have their own conclusions before deliberations have even begun (Ellsworth, 1993). It is important to remember that all of the jury members have listened to the same information and testimony! Jurors bring their life experiences, knowledge, and personal information into the jury box, and these varieties are making a difference in the process (Ellsworth, 1993). Although differing perspectives is what today's trial by jury system is based on, misunderstandings and misinterpretations of factual information is unsettling. Phoebe Ellsworth says it best when she refers to Kalven and Zeisel's study and notes, "Juries are rarely unanimous on the first ballot, and this, because the evidence

presented is the same for all the jurors, individual differences must make a difference. The evidence presented it the same, but the evidence perceived by the jurors is not" (Ellsworth, 1993, 61). This idea is at the heart of what my research is seeking to accomplish.

After jury members are sent to deliberate, researchers are continuing to try and understand what goes on next. Studies have suggested that jurors actually spend little time "evaluating the admissibility of [the] evidence they are using" (Ellsworth, 1993, 47). In fact, jurors tend to stereotype the case proceedings and their initial perceptions are a strong basis for their verdict (Ellsworth, 1993). These perceptions' sources include one's background characteristics, both innate and learned. This is why I will test these characteristic's effects on one's perceived importance and understanding on the evidence to gain a better idea of the extent of their influence on a juror's verdict.

Kalven and Zeisel's (1966) work has also explored this idea, sticking to initial judgments in care proceedings. They found that nine out of ten times the juror's initial verdict determines the final verdict (Kalven & Zeisel, 1966). Research has shown that jurors are not found to be incompetent, but tend to be more sympathetic towards the defendant or loosely interpret the standard "beyond a reasonable doubt" (Eisenberg et. al, 2005). I would argue that although the jury members may get some facts of the case correct, they may be unable to correctly interpret complicated evidence, such as DNA. This problem is not one of improperly recalling the information, but of not *understanding* it in the first place and because people are set in their opinions from the start, any chances of later learning and reviewing the evidential information may be unlikely.

Finally, there is reason to believe the fact that verdicts are determined in groups may help the process. When asked independently, a juror's fact retention tends to be on the poor side. However, when they are together, their collective recall increases tremendously (to about 90% for evidence information and 80% for judicial instruction) (Hans and Vidmar, 1986). It is this collective thinking that seems to be the key to the jury's success because judicial instructions, the law, and evidence can be complex. For the purpose and success of this study, it is crucial to monitor the changes that take place in the group, because the groupthink itself could be what is leading these jury members to make more informed and reliable decisions.

When exploring what exactly jury members do understand, I turn to an experiment conducted by Pozzula et. al (2006). They analyzed jury reliability as it relates to witness identification. In a randomly assigned experiment, mock jurors were asked to estimate the reliability of testimony given that the witness made a positive, negative or "foiled" (false positive) identification. Pozzula et. al found that positive witness identification (both truly accurate and inaccurate) had a positive relationship with guilty verdicts (Pozzula et. al, 2006). In all cases, jurors were found to be confident in their verdicts (Pozzula et. al, 2006). Additionally, jurors who perceived a witness to be reliable, found the witness's testimony to be credible as well (Pozzula, et. al, 2006). This finding is important because it shows that positive test results presented by a witness, whether accurate or not, are still perceived as reliable and therefore have the ability to influence a juror's decision (i.e. resulting in a guilty verdict).

Legal interpretation of evidence by jury members is always going to be a daunting task. Jury trials, although some find them interesting, are long, intense and full of legal

jargon. Adding a layer of scientific testimony is likely to confuse the jury members who are essential to the decision-making process. Sheila Jasonoff however, argues that the confusion is not entirely the fault of the experts and scientists. Courtroom litigation is in itself inherently confusing and complex, as such it is party to blame for jury misunderstanding and misinterpretation (Jasonoff, 1998).

DNA and its Effects on Jury Decision-Making – The specific introduction of DNA evidence in the courtroom has been shown to have effects on the jury decision-making process. A study conducted by Lieberman et al. (2008), sought to better understand which components of a trial were important to jurors when they were faced with DNA evidence. In recent years, DNA evidence, when presented as part of the testimony, has been deemed by jurors to be more credible than eye-witness accounts. Lieberman et al. refer to the phenomenon as DNA evidence becoming a "heuristic cue". They argue that "most jurors have preconceived beliefs about the strength and reliability of DNA evidence on the basis of the popularity of high profile news stories and television programs" (Lieberman, et al., 2008, 24).

Lieberman et al. (2008) cites previously conducted studies that found guilty verdicts are more likely to result when DNA evidence is presented. Their exploration into this idea included volunteers who filled out surveys after being presented with different trial scenarios. Volunteers were asked to rate their perceptions of the accuracy of various types of data and rate its persuasiveness in conjunction with the trial. Overall, Lieberman et al. found that eyewitness testimony was not a huge factor in the volunteer's decisions, and that DNA evidence was thought to be the most accurate and persuasive. In the end, Lieberman et al. found that "jurors placed high value on DNA evidence and that

these attitudes carried over to verdict decisions", which in turn led to high rates of conviction (2008). Other evidence suggests that a positive relationship is found between the amount of evidence in a case and a jury's propensity to find a suspect guilty (Hans and Vidmar, 1986). One could argue that if the prosecution has a lot of fancy talk, charts and diagrams, they may be wooing the jury into a guilty verdict. Furthermore, the jury has somewhat come to expect such an act because that is what they see on television.

Lieberman et al. (2008) expanded their studies to include another experiment which utilized "damaging cross-examination testimony". Lieberman et al. defined this to be the acknowledgment of an increase in inaccuracies in the DNA processing lab, a break in the chain of custody in the handling of the evidence and the inability of the victim to identify her attacker in a line-up. Despite the presence of "damaging cross-examination testimony", jurors were still more likely to convict the defendant in instances where DNA was the manipulated variable. The same was true when other types of biological evidence (i.e. blood typing) were included, even though the experimental condition specified that the DNA samples in question did not match. The experimenters concluded that the study results were due to a misunderstanding of what DNA and other forms of scientific evidence are and how they differ (Lieberman et al., 2008). This finding may be a major concern when it comes to using this kind of evidence in court.

Standards of Proof - Scientific innovations are constantly being made and in turn their use in court is virtually uncharted judicial territory. In order to create guidelines for the use of DNA and other scientific evidence, the *Frye* standard was the first standard adapted (*Frye* v. United States, 293 F. 1013 (D.C. Cir.1923)). Whenever scientific evidence use during trial is a possibility, the *Frye* standard must be met before hand, and

a corresponding hearing is used to determine whether the evidence meets the standard. A *Frye* hearing specialized in the use of "novel" evidence. The standard itself required the "general acceptance" of the science among the relevant scientific community ("Ninth Circuit Rules", 1995). The standard of "general acceptance" arose from a case that wanted to use a systolic blood pressure deception test (which was basically an early form of the polygraph). The use and mechanics of the test were relatively unknown. Thus, in order to approve the test's use in the courtroom, it was determined that any scientific evidence presented needed to first meet the standard of "general acceptance" within the scientific community (Jasonoff, 1998).

In the case of presenting DNA in a *Frye* hearing, experts were expected to testify that the DNA matches the defendant with the exclusion of all others ("Ninth Circuit Rules", 1995). Specifically, in the case of United *States v. Chischilly*, the *Frye* standard came under scrutiny because "general acceptance" proved hard to define and inconsistent to apply. Experts asked questions such as, 'at what point is a scientific innovation considered to be generally accepted?' Upon appeal in the *Chischilly* case, the admissibility of the evidence, as well as the presented statistics (one in 1,563 is the probability of finding a similar match from the Native American population, which is the population the defendant was from) came under scrutiny. It was determined in the appeal that the "general acceptance" threshold was too hard to determine and another standard was needed to address the issue of DNA admissibility ("Ninth Circuit Rules", 1995).

To address this concern, the *Daubert* standard was implemented (*Daubert v. Merrell Dow Pharmaceuticals*, 133 S. Ct. 2786 (1993)). The standard came out of a case from two plaintiffs who tried to argue that their birth defects were the cause of an anti-

nausea drug, Benedectin, which their mothers took while pregnant. Much expert witness testimony was brought to argue that the plaintiffs' claim was statistically possible. However, the judge ruled since there was not any peer reviewed research done, the evidence was not sufficient to support the plaintiffs' accusation (Annas, 1995). The Supreme Court took the case and determined that peer review publications are the best "non-biased checks on scientific opinion available to the course and should, therefore, be employed to the extent feasible" (Annas, 1994, 1019). This last idea goes beyond the previous standard of "general acceptance" and requires scientific evidence to be considered as "reliable" among experts.

Daubert states, "evidence should be scientifically reliable and *relevant* in order to be admitted" (Jasonoff, 1998, 722). Unlike the *Frye* standard, which utilizes a threshold of "general acceptance", *Daubert* requires a "balancing of factors" test ("Ninth Circuit Rules", 1995). *Daubert* requires a balance of factors to be considered including a testable theory, evaluation of whether the theory has been subject to peer review, the potential rate of error for the methodology in question, and finally, whether the theory is generally accepted ("Ninth Circuit Rules", 1995). It was determined that this last requirement of general acceptance was still needed to avoid any potential jury confusion (Annas, 1994).

This more concretely defined *Daubert* standard of evidence is still used today. One strength of *Daubert* is its "firm rejection in any once test" since peer reviews are not free from error (Annas, 1994). The *Daubert* standard also allows the judge more discretion in allowing the evidence's use in testimony. Presently, DNA evidence is deemed scientifically reliable, has a theoretical reason for being used as a form of testimony and therefore can be used in court. However, jury members are still left to

decode scientific jargon and to understand the complicated DNA testing process (McDonald, 1998). Finally, *Daubert* is applied in federal courts and only some state courts (34 of them, 6 of which have yet to completely reject the Frye standard). Many other states utilize the aforementioned Frye standard (16 states). The four remaining states (Georgia, Utah, Virginia and Wisconsin) have developed their own standard for evidence (Post-Daubert standards for Admissibility of Scientific and Other Expert Evidence in State Courts, American Law Reports (5^{th} Ed) Volume 90, Page 453 (2001).

Often in scientific cases, the defense is looking for flaws in any collection methods, chain of custody issues, and other mistakes that might have taken place during the investigation. Anything that could compromise the integrity of the evidence itself is going to be amplified by the defense counsel, possibly further confusing jury members. The defense tries to show that although the data is generally reliable, reliability in the case at hand may be limited due to technical reasons or mistakes made. The experimental trial used in this analysis was manipulated so there were no breaks in the chain of custody, making this particular issue not a concern. If this had been an issue, the evidence may be deemed unacceptable by both the law and the jury, so the researchers wanted to eliminate this possibility for doubt (Jasonoff, 1998). The idea presented here or jurors believe the information to be infallible, even though in this situation it clearly is, is a major concern I wish to address. I want to be aware of if jurors understand the information being presented to them.

DNA Testing - The use of DNA and other scientific evidence in criminal proceedings has become increasingly popular over the past 30 years (Shelton, 2008). Using evidence that cannot be seen by the naked eye can be a disturbing thought to those

trying to process complex concepts. It is important that juries become comfortable with science in the courtroom, particularly the science of DNA evidence, because cases with such evidence have a higher probability of going to trial (Stevens, 2008). This increased probability is due to the fact that DNA evidence has been shown to have an impact on a juror's decisions and has the potential to reach a positive match with a high degree of probability (Stevens 2008).

When DNA evidence is analyzed in a lab for identification purposes, enzymes are added to the sample, which "cut" the DNA at certain points in the strand (between targeted base pairs or nucleotides). These cut pieces are processed through a gel, which has an electric current running through it (McDonald, 1998). The current pulls the "cut" pieces away from each other. The small pieces travel farther through the gel than the larger ones, producing a striped or banded pattern. Each person's DNA yields a unique striped pattern, which allows scientists to determine if the DNA collected and the DNA sample is a match (McDonald, 1998). It has been argued that "no other [identity] test can give such certainty" (Jasonoff, 1998).

Mitochondrial or mtDNA contains protein indicators that are transferred through the mother's genetic material and can help identify genetic similarities between subjects. However, it is not as conclusive as nuclear or nDNA (Dann, Hans & Kaye, 2006). Someone is more likely to be declared a "possible contributor" in cases that utilize mtDNA evidence because there are fewer nucleotides or "ladder rungs" in the mtDNA chains than nDNA (16,500 vs. 3 billion). Although MtDNA is not a "unique identifier" because "any other person in the same maternal linage can have the same type" it is

unlikely that two people would have the same sequence of nucleotides due to "high levels of sequencing variation" that is present in DNA (Wagner, 2005, 14).

Media Influence – I believe it is noteworthy to address DNA and other scientific evidence's increased presence in the media because it is a major source of misinformation. The media has always had a dominant role in the public sphere and its influence sometimes carries over into the legal world.

The proliferation of DNA evidence in violent crime cases, combined with the surge in television shows which dramatize DNA processing, increases the need for juries to be able to sort the scientific facts from the media fiction. The potential for juries to conflate information from television with information from qualified experts makes it even more important to understand the jury decision making process. During trials in which jury members are inundated with a massive amount of scientific evidence, jurors may apply the pseudo-scientific 'knowledge' they have gained from television shows to the evidence presented to them in the courtroom. When citizens become jury members, they include the expectations taken from the media in their deliberations and deductions of the evidence (Shelton, 2008).

One example is the "CSI Effect," a phenomenon with which the prosecution is becoming increasingly concerned. Dennis Stevens defines the "*CSI* Effect" as "fictionalized accounts of forensic analysis practices" (Stevens, 2008, 37). Stevens argues that jurors may perceive the processing and analysis of data found at a crime scene to be as "swift and certain as seen on prime-time dramas". This perception is subsequently impacting the presentation and proceedings of trials (Stevens, 2008, 39, 37). Jurors' believe that all DNA evidence is processed using high tech machines to get

instant and absolute results. Stevens further argues, that the investigative illusions of jurors "place an extraordinary hardship upon the justice system" (Stevens, 2008, 33). Both legal teams and the jury are affected by this new wave of 'Crime-Drama' entertainment. The "*CSI* Effect," in addition to other misconceptions of DNA held by jurors, is why we need to understand how each party involved is affected, to what extent, and what we can do to address the situation.

In a study done by Dennis Stevens (2008), 56% of lawyers "said that juries were always influenced by forensic analysis" (Stevens, 2008, 46). Jurors interviewed after trials have admitted that their television watching has raised their evidence expectations in the courtroom (Bergslien, 2006). Other jury surveys show 46% "expected to see some kind of scientific evidence in every criminal case" (Shelton, 2008). This further demonstrates the increasingly high expectations of jury members. This worries the prosecution because jurors' high expectations are influencing their decisions (Bergslien, 2006, 690), and the problem is becoming more prevalent. The television may be "teaching" jury members about scientific evidence, but television does not provide sufficient information about how, when, and if it is applied to a case (Bergslien, 2006).

The legal community needs to be aware that juries are using 'junk science' to shape their decision making process and reach verdicts (Lawson, 2004). There needs to be an emphasis regarding correct DNA information and collection methods, without confusing the jurors; otherwise, the jury members may resort to their false knowledge. Lawyers need to keep in mind that 'lay institutions' and the scientific community come together in the courtroom and the need for mutual understanding is crucial (Jasonoff, 1998). Furthermore, we need to understand the extent to which DNA evidence is playing

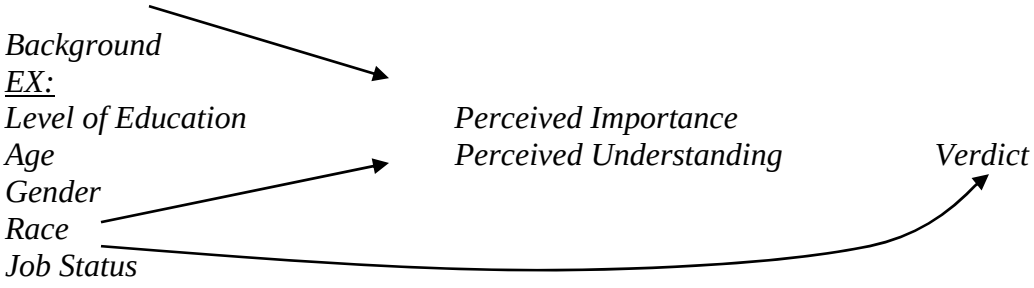
a role in the decision making process. Juror reliability needs to be examined. If jurors find the DNA evidence useless, then the legal teams would be better off saving time and money by foregoing their elaborate scientific presentations. However, if scientific evidence is playing a major role in juror's judgment, then appropriate methods should be implemented to reduce potentially skewed perceptions.

Hypothesis – The literature review has presented some concerns. If jury members are using the fact that DNA is present in a case as a basis to find someone guilty, then that is an issue of concern. It is important to learn if jurors are understanding the information or not. If they cannot properly process the information, then decisions may be made erroneously. The purpose of my study is to *understand and measure jury reliability* (for this specific case, defined as a juror's ability to come to a guilty verdict) when presented with scientific data through attitudinal measures regarding the *importance* and *understanding* of mtDNA evidence during a criminal trial. I hypothesize one's background (experiences, age, gender, race and knowledge) will influence jury decision-making and, in turn, the verdict. I also hypothesize that one's *perceived importance* as well as *understanding* of mtDNA evidence presented during a case will greatly influence one's decision. Finally, I believe the group deliberation process will sway these factors, resulting in a higher probability of a guilty verdict.

Through my research, I seek to understand whether personal factors such as scientific background and education have an effect on the *perceived importance* of DNA in a case. I also intend to evaluate if the same factors have an influence on one's *understanding* of the DNA evidence. By getting a better idea of the factors that influence these personal opinions, I will be able to make better judgments about what is going on in

the jury room. In turn, once I know what shapes a juror's perceived importance and understanding, I can draw better conclusions on what shapes the decision making process. A diagram better illustrating this idea can be seen in Figure 1.

Figure 1: Influential Factors of Decision Making



(These beginning characteristics can have a direct effect on the likelihood of a guilty verdict as well)

I believe there is a need to better understand jury decision making as a whole, in particular with regards to scientific evidence. The literature indicates that sometime DNA evidence is taken as gospel, and defense attorneys are struggling to protect their clients due to the presence of a fine hair or a tiny fiber. If DNA is perceived by the people to be infallible, do they really understand how it works?

Chapter 3 – The Methodology

For my study, I will be using a previously collected survey data set entitled, "Testing the Effects of Selected Jury Trial Innovations on Juries Comprehension of DNA Evidence in New Castle County, Delaware, 2003" by Michael Dann, Valerie Hans and David Kaye. The original intent of this data was to try to better understand whether and how certain jury innovations can influence a jury's understanding of scientific data presented to them. The sample from the Dann, Hans and Kaye experiment was chosen from a group of 3,381 volunteers from an original pool of potential jury members who ultimately were not needed for actual trials. The experimenters made announcements during actual jury selections and mentioned the possibility of a cash reward if selected for the experiment. The volunteer rate was 74%, and the final 480 mock jury study participants were chosen from this group of volunteers. Each jury in the study was randomly assigned to a condition that pertained to the researcher's desire to measure different trial "innovations". The six conditions tested are listed below:

A. No innovations (control)

B. Note taking

C. Question asking and note taking

D. DNA checklist and note taking

E. Jury notebook and note taking

F. All of the above

The trial proceedings were replicated from an actual armed robbery case (*State v. Pappas*) in which the defendant was ultimately found guilty, which is the reason for my study, guilty will be considered to be a reliable outcome. In the original study, many

types of testimony were utilized including expert and regular witnesses. For the purpose of the original study presented mtDNA evidence was constructed to be more ambiguous, making the information even more crucial to the final outcome (Dann, Hahn & Kaye, 2004). All sixty juries watched the same video taped mock trial, which was seventy minutes long.

The original surveys were designed to measure a juror's overall understanding of mtDNA evidence in conjunction with trial innovations. There were three surveys implemented during this study. First, there was an initial questionnaire gauging the participants' thoughts regarding some background information. Then after the jury members witnessed the taped trial, they were asked a series of questions gauging their understanding of the trial, the evidence and their opinions on various elements of the case. Finally, jury members were asked to deliberate and come to a verdict. Another questionnaire was given after these deliberations to further look at the overall process and gauge jury member's options. The surveys included a total of 121 survey items, many of which utilized Likert-type scales. These surveys were meant to monitor the three phases of the study. For the first phase of the study, all 3,381 volunteers completed an initial questionnaire in order for the researchers to gain insight regarding previous knowledge and views regarding science. This helped to enable the experimenters to make an assessment about the trial information and the usefulness of the scientific data, in turn strengthening the validity of their findings. Next, 480 mock jury members were randomly selected to continue to the second phase of the study.

My Analysis – The ultimate goal of my study is to better understand what goes into juror thoughts, and in turn the decision making process. In order to measure a

"correct" decision, I have operationalized jury reliability as a jury member's ability to utilize the presented information and testimony and reach a *guilty* verdict. The trial my data was based off of resulted in a guilty verdict, therefore it will be assumed that guilty is the "correct" decision for the purposes of this study. However, my ultimate goal is to better understand what goes on in the jury decision-making process in order to increasingly result in reliable decisions, whether it's putting someone behind bars or setting another one free. This concern goes back to the idea that jurors are more likely to convict with the sheer presence of DNA evidence in a trial, a disconcerting thought. It is important for conclusive, properly handled DNA to be the example of proper DNA use in court, whereas inconclusive DNA needs to be brought to the public's attention as a very real possibility.

For my study, I have three primary research question if interest, they include:

1) Do personal judgments regarding the validity of science greatly influence how important or influential a juror perceives DNA (specifically mtDNA) evidence to be to a case?
2) Do personal characteristics affect a juror's ability to understand DNA testimony and in turn, their ability to make informed decisions?
3) To what extent do group influences have on the decision making process?

Using attitudinal measures from a previously collected data set, I hypothesize one's previous experiences, characteristics and knowledge (*background*) has a substantial influence one a juror's perceived importance and understanding of mtDNA evidence in a criminal trial.

For my analysis, I am a focusing on a select number of variables and monitoring significant changes that may occur before and after jury deliberation. Questions regarding demographics and background characteristics were asked after deliberations. Individual feelings regarding the defendant's guilt were asked both before and after deliberations, with the addition of measuring the final verdict[1]. In the end, 43.3% of juries found the defendant not guilty, 33.3%, guilty and 23.3% resulted in a hung decision. The only variable that is unique is understanding, which is a question item asked both before and after the juries deliberated.

The variables – To answer Research Question #1, I will analyze perceived importance and understanding of the scientific criminal proceedings. The attitudinal item from the survey I will focus on is "How important was mtDNA evidence to your decision?" (Dann, Hans & Kaye, 2004). This was measured using an attitudinal scale from 1 to 10 (10 = 'very important') (Dann, Hans & Kaye, 2004). *Importance* was later recoded to split at the median (a weight of 7) in order to create 2x2 and 3x2 tables as well as for the logistical regressions.

To measure 'understanding' for research question #2, I will use the question from the survey "Do you feel you understand the mtDNA testimony?". This was measured using a 1-5 item Likert-type scale was utilized, including response categories that ranged from 'not at all' (1) to 'very well' (5) (Dann, Hans & Kaye, 2004). It was recoded into two categories of *well* which included "well" and "very well" ("1") and *not well* which

[1] Before deliberations, individual measures of verdict revealed that 231 (48.1%) thought the defendant was guilty, 162 (33.8%) not guilty and 86 (17.9%) were unsure [one response was missing]. After deliberation, results show 242 (50.4%) thought the defendant to be guilty, 216 (45%) not guilty and 22 (4.6%) were unsure.

included "not at all", "slightly" and "somewhat" ("0")[2]. I believe these survey items adequately reflect a jury member's thought process with regards to the presented scientific evidence, as well as help measure any possible group effects.

There are a few variables I will utilize to determine one's background. The first variable I consider to be influential to a juror's decision making is *education*. This will be measured by asking, "How many years of school have you completed" and "How many science and math courses did you have in high school and/or college?". I am also interested to see if one's previous experience on a criminal jury trial will affect their decision making. *Criminal jury* asks, "Have you ever served on a jury in a criminal case?" (Yes or No). Finally, I will include measures of *age, gender, race* and *job status*, with the latter three recoded as dummy variables (male=, white=1, full time employment=1). All of the aforementioned variables were measured AFTER jury deliberations, with the exception of *understanding*, which was asked both before and after. A summary all of my variables of interest descriptive statistics can be seen in Table 1.

Table 1: Descriptive Statistics

	Observations	Mean	Standard Deviation	Minimum	Maximum
Verdict	477	1.798742	0.7921347	1	3
Verdict (Dummy Variable)	477	0.3333333	0.4718994	0	1
Perceived Importance	469	6.439232	2.969941	1	10
Perceived Understanding (Pre Deliberation)	474	3.43038	0.843082	1	5
Perceived Understanding (Post Deliberation)	476	3.42437	0.843082	1	5
Level of Education	477	3.287212	1.048861	1	5
# Of Science/Math Classes	356	5.741573	2.751811	1	16
Previously Servied on a Criminal Jury Trial?	476	1.903361	0.295776	0	1
Age	477	43.14885	12.33789	20	81
Gender	477	1.51782	0.500207	0	1
Race	476	0.789916	0.4077966	0	1
Job Status	476	0.7268908	0.4460252	0	1

[2] For the purposes of this study, it is important to keep in mind that understanding is a subjective measure of how one feels they understand the evidence, not a tested measure of how well they understood the evidence.

I rationalize that each of these variables are tied to the *importance* and *understanding* of DNA evidence as well as a juror's ultimate decision. For example, I hypothesize that the more science background a person has, the more they will understand presented mtDNA evidence. In this study, most people had taken more than nine science courses during their high school and/or college careers (Dann, Hahn & Kaye, 2006). Additionally, if jurors have been on a criminal trial before, that may have an effect on the way they engage in the decision making process.

I also believe that it is important to include the original innovation conditions in the models because the ability to take notes or use checklist could be having an impact on one's information processing, particularly understanding. I will include dummy variables for all six conditions (note taking, note taking + questions, note taking + check lists, note taking + notebook and all innovations) with the use of no innovations as the reference category. Eighty jury members were placed in each of the six conditions.

Statistical Methodology: In my statistical analysis for research questions #1 and #2, I will be using binary dependent variables. I am looking to test my hypothesis a few different ways. The first way will include measuring guilt and splitting the variable to reflect not-guilty/hung decisions = "0" and guilty decisions = "1". By doing this, I can learn more about the *guilty* convictions and how influential mtDNA evidence was to the decision-making process. Also, I will be about to convert the outcomes into odds ratios, making clearer statements about the interactions taking place between the variables.

To answer Research Question #3, I will look at the relative risk associated with each of my independent variables on my dependent variable of interest (guilt)[3]. In order to gauge group effects, I have created *change* variables that look at changes between

[3] Significance for the relative risk analyses was determined using Pearson's Chi Square at the 0.05 level

guilty, not guilty and unsure. This is a compilation of combinations asking jury members how they felt before and after deliberation regarding the verdict. This is measured at the individual level. For the logistical regression, those who changed from either not guilty or hung to guilty *or* stayed consistent in believing the defendant were guilty was coded as a "1", and all other combinations were coded as a "0" (not guilty to not guilty/hung and hung to hung/not guilty). For the relative risk analysis, I was able to split the variable into no change/change to guilty/change to not guilty. This is the best way to measure any changes that may be occurring as the result of group deliberations.

Finally, I will be using education, jury trial experience, age, gender, race and job status to gauge their influence on perceived importance and understanding. Many of them were converted into dummy variables. Verdict (guilty/not guilty + hung), criminal jury (yes/no), gender (male/female), race (white/all others), job status (full time employed/all others) were converted into dummy variables with the reference category reflected the first option listed in the aforementioned description (guilty, yes, male, white, full time employed, respectively). These newly recoded variables were used in both the multivariate and bivariate analyses. The perceived importance and understanding variables I used in the following models were measured after the juries deliberated, unless otherwise noted. By determining what factors influence one's feelings regarding mtDNA evidence, I can draw better conclusions about a juror's propensity to vote guilty. Lastly, all missing data was excluded from my results, which in most cases was 1-3 people. However, for one questions "How many science and math courses did you have

in high school and/or college?" 119 responses were missing, and therefore dropped from my analysis[4].

[4] To ensure statistical strength, I ran all of the following models without "number of science/math classes" as well as converted the missing data to equal the mean (5.73). All of the tables showed minimal differences, so the original model with the dropped responses was used.

Chapter 4: Results

Multivariate analysis: The first part of my analysis utilized logistical regression to better understand the influential variables in this study. This type of regression allows the use of odds ratios to draw better conclusions about the various interactions. The first part of my analysis analyzes the effects of my independent variables. By making perceived importance and understanding dependent variables and therefore gaining a better perspective of what influences them, my analysis has stronger implications. Table 2 shows that race and the use of all innovations during the trial were the only significant variable that has an influence on perceived importance. White people are 1.816 times more likely to think the mtDNA evidence presented during the trial was important. One reason for this can be feelings of injustice among minorities in the criminal justice system, but what is truly going reflected here remains unclear and is perhaps due to some omitted variable bias.

Table 2: Perceived Importance and Understanding as Dependent Variables

Perceived Importance (Number of observations = 345)		
	Odds Ratio	**Z-Score**
Level of Education	1.153	0.55
# Of Science/Math Classes	0.979	-0.08
Previously served on Criminal Jury Trial?	0.674	-1.00
Age	1.004	0.44
Gender	1.119	0.49
Race	1.816**	2.04
Job Status	0.779	-0.95
Note Taking	0.985	-0.04
Notes + Questions	1.223	0.53
Notes + Check List	1.067	0.17
Notes + Notebook	1.303	0.68
All Innovations	2.884**	2.60

Perceived Understanding (Before Deliberation) (Number of observations = 350)		
	Odds Ratio	**Z-Score**
Level of Education	1.977**	2.54
# Of Science/Math Classes	2.001**	2.72
Previously served on Criminal Jury Trial?	1.016	0.04
Age	0.975**	-2.56
Gender	0.743	-1.25
Race	1.645	1.64
Job Status	0.859	-0.56
Note Taking	0.730	-0.79
Notes + Questions	1.583	1.15
Notes + Check List	1.085	0.20
Notes + Notebook	0.777	-0.62
All Innovations	1.990**	1.67

Perceived Understanding (After Deliberation) (Number of observations = 348)		
	Odds Ratio	**Z-Score**
Level of Education	1.432	1.35
# Of Science/Math Classes	2.663**	3.81
Previously served on Criminal Jury Trial?	1.182	0.40
Age	.9717**	-2.88
Gender	0.952	-0.21
Race	1.467	1.25
Job Status	0.596	-1.87
Note Taking	0.854	-0.39
Notes + Questions	1.640	1.23
Notes + Check List	1.104	0.24
Notes + Notebook	1.319	0.68
All Innovations	2.358**	2.04

(**p<0.05, *p<0.10, two tailed)

Also, the use of all of the tested jury trial innovations proved to be significant. Those who were allowed to use the various techniques were 2.884 times more likely to believe the evidence was important. Perhaps this is because certain groups received various ways to keep track of the complicated data and therefore were lead to believe the information was especially important. This variable showed to be significant with regards to all three variables (importance and pre/post understanding).

The two subsequent models reflect a juror's understanding of scientific evidence both before and after deliberation. One's level of education and the number of science and math classes one has taken has a significant effect on a juror's understanding of mtDNA evidence. This finding confirms my hypothesis of a jurors' background having an influence on their understanding and importance of presented evidence; the more knowledge one has, especially in relation to the subject, the more likely they are to understand it. Specifically, those who had taken a numerous science/math classes were two times as likely to understand the mtDNA evidence. This was consistent both before and after jury deliberation.

Another interesting finding is the influence age has on the outcome. The younger someone is, the more likely they are to understand mtDNA evidence. This was found to be true both before and after deliberations. This could be for a few reasons including an increased emphasis on the subject in school in the past 20 years and the proliferation of crime and DNA in today's culture.

Next, I manipulate importance and understanding in conjunction with all of my variables of interest. The dependent variable in Table 3 is verdict, my primary variable of interest. First I included only importance to measure its effect on my other independent variables. Then I ran the same regression with just understanding. Finally, I included both perceived importance and understanding to the model. All of the outputs show that one's perceived importance of mtDNA evidence is extremely pertinent to one's propensity to vote guilty. Jurors were 5.459 times more likely to find the defendant guilty if they thought the information was important. When looking at understanding, it was also influential to the decision making process, revealing significance in all three models. Understanding's significance decreases slightly in the final model, but not by much (2.664 vs. 2.080).

Table 3: Guilty vs. All Other Outcomes

Perceived Importance (Number of observations = 345)	Odds Ratio	Z-Score
Importance	5.459**	5.97
Level of Education	1.216	0.65
# Of Science/Math Classes	0.844	-0.59
Previously served on Criminal Jury Trial?	0.404*	-1.74
Age	1.014	1.23
Gender	1.292	0.96
Race	0.990	-0.03
Job Status	1.721*	1.74
Note Taking	0.472	-1.44
Notes + Questions	3.048**	2.49
Notes + Check List	1.068	0.14
Notes + Notebook	2.188*	1.72
All Innovations	2.589**	2.10

Perceived Understanding (Number of observations = 350)	Odds Ratio	Z-Score
Understanding	2.664**	3.64
Level of Education	1.155	0.51
# Of Science/Math Classes	0.668	-1.44
Previously served on Criminal Jury Trial?	0.376*	-1.95
Age	1.021*	1.92
Gender	1.299	1.04
Race	1.079	0.24
Job Status	1.611	1.59
Note Taking	0.468	-1.50
Notes + Questions	2.823**	2.48
Notes + Check List	1.033	0.07
Notes + Notebook	2.090*	1.72
All Innovations	2.878**	2.45

Both Perceived Importance and Understanding (Number of observations = 344)	Odds Ratio	Z-Score
Importance	4.853**	5.45
Understanding	2.080**	2.54
Level of Education	1.159	0.48
# Of Science/Math Classes	0.729	-1.06
Previously served on Criminal Jury Trial?	0.411*	-1.69
Age	1.019*	1.66
Gender	1.343	1.09
Race	0.929	-0.21
Job Status	1.863*	1.94
Note Taking	0.493	-1.34
Notes + Questions	3.006**	2.42
Notes + Check List	1.110	0.22
Notes + Notebook	2.202*	1.71
All Innovations	2.524**	2.02

(***p < 0.01, **p<0.05, *p<0.10, two tailed)

Another interesting finding is if one served on a criminal trial before, it decreased one's likelihood of reaching a guilty verdict. This correlation was found in all three models. Also, when both importance and understanding, and understanding alone were in the model, age proved to have a significant affect on whether someone voted guilty. Older jurors were 1.021 times more likely they were to find the defendant guilty. This finding could be rationalized by arguing older adults tend to be more conservative in their views and therefore may be more cynical towards the defendant.

Finally, many of the note-taking measures proved to be significant, with the most influential variable being the ability to ask questions in addition to taking notes. Jurors who had the opportunity to take notes and submit questions were 3.006 times more likely to find the defendant guilty when both perceived importance and understanding were in the model. The use of "all innovations" showed a high level of significance as well.

Next, I changed the dependent variable to better measure changes that may be taking place. Again, the independent variables were measured after deliberation, and my dependent variable was measured dichotomously (change to guilt/all other outcomes). Changing one's mind to guilt also includes those who felt the defendant was guilty all along, also supporting Kalven and Zeisel's 1966 findings similar to the support seen with the bivariate analysis. By doing this, I could best capture one's propensity to reach a guilty verdict. Table 4 depicts this outcome. Again, perceived importance and understanding of the mtDNA is significantly influential to the decision making process. A juror was 3.072 times more likely to change their minds to a guilty verdict if they thought the information was important. If understanding was high, one was 2.873 times more likely to change to a guilty verdict.

Table 4: Change to Guilty vs. All Other Outcomes

Perceived Importance (Number of observations = 344)	Odds Ratio	Z-Score
Importance	3.072**	4.70
Level of Education	0.995	-0.02
# Of Science/ Math Classes	0.949	-0.20
Previously served on Criminal Jury Trial?	1.513	0.99
Age	1.025**	2.41
Gender	1.568*	1.87
Race	1.359	1.00
Job Status	1.034	0.12
Note Taking	.4734*	-1.81
Notes + Questions	1.031	0.08
Notes + Check List	0.882	-0.31
Notes + Notebook	1.659	1.23
All Innovations	1.430	0.85

Perceived Understanding (Number of observations = 349)	Odds Ratio	Z-Score
Understanding	1.660**	2.09
Level of Education	0.996	-0.01
# Of Science/ Math Classes	0.841	-0.67
Previously served on Criminal Jury Trial?	1.242	0.53
Age	1.027	2.70
Gender	1.521**	1.81
Race	1.447*	1.25
Job Status	1.020	0.04
Note Taking	0.484*	-1.82
Notes + Questions	1.111	0.27
Notes + Check List	0.904	-0.26
Notes + Notebook	1.667	1.29
All Innovations	1.629	1.21

Both Perceived Importance and Understanding (Number of observations = 343)	Odds Ratio	Z-Score
Importance	2.873**	4.32
Understanding	1.334	1.12
Level of Education	0.976	-0.09
# Of Science/ Math Classes	0.880	-0.47
Previously served on Criminal Jury Trial?	1.422	0.83
Age	1.026**	2.56
Gender	1.561*	1.85
Race	1.374	1.03
Job Status	1.077	0.26
Note Taking	.478*	-1.78
Notes + Questions	1.001	0.00
Notes + Check List	0.880	-0.31
Notes + Notebook	1.638	1.19
All Innovations	1.360	0.73

(**p<0.05, *p<0.10, two tailed)

The most interesting and new finding in this set of regressions can be seen with gender. The results indicate that females are significantly more likely to change their minds and find the defendant guilty. I believe this could be happening for a few reasons. Women tend to change their minds more than men (I am no exception). Also, perhaps because the defendant was a man, they could have felt more threatened by him. Although the reason is not clear, it is one of the stronger findings in this set of results.

Bivariate analysis: The second half of my analysis utilizes relative risk in conjunction with all of my independent variables of interest. The primary reason for this part of my analysis is to compare outcomes to measure any effects, if any, and their magnitude. Relative risk is a comparative measure, which demonstrates the positive or negative changes occurring within various situations.

For the first part of the bivariate analysis, I wanted to use perceived importance and understanding as dependent variables to better look at what factors influence these perceptions. First, I looked at importance (Table 5). My output shows that understanding greatly influences how important a juror perceives the evidence Here we see that 65.30% of those who understood the evidence well (pre-deliberations) perceived mtDNA testimony to be important as well). A similar number (68.58%) emerged from those who understood the evidence well (post-deliberations). Understanding the evidence both before and after deliberations proved to be significant. This finding shows great correlation between importance and understanding. It is important for the juror to understand the testimony, and the more they understand it, the more likely they are to believe it's important.

The only other significant variable was race, showering that those who are white were more likely to perceive the evidence to be important (58.22%). This could possibly be explained by a widespread distrust in the system by minorities who believe the system is corrupt.

Table 5: *Perceived Importance* as the Dependent Variable

	Variable	Perceived Importance
Understanding		
	Well (Pre-Deliberation)	65.30*
	Not Well at All (Pre-Deliberation)	47.77
	Well (Post-Deliberation)	68.58*
	Not Well at All (Post-Deliberation)	43.39
Education		
	Some College or more	57.64
	High School or less	50.00
	5+ Science/Math Classes	54.59
	1-4 Science/Math Classes	53.64
Served a Criminal Trial?		
	Yes	58.22
	No	45.36
Gender		
	Male	55.70
	Female	55.60
Race		
	White	58.22*
	All Others	45.36
Job Status		
	Full time Employed	53.53
	All Others	60.94
Note Taking		
	Yes	51.95
	All Others	56.38
Notes + Questions		
	Yes	55.84
	All Others	55.61
Notes + Check List		
	Yes	51.90
	All Others	56.41
Notes + Notebook		
	Yes	52.56
	All Others	56.27
All Innovations		
	Yes	63.29
	All Others	54.10

(*$p<0.05$)

The next variable I used as a dependent variable was understanding before deliberation (Table 6). I found that importance was a significant factor, indicating that the more important one thought DNA evidence to be, the more likely they were to understand it (pre-deliberation) (54.79%). Both measures of education proved significant, therefore the more education one has the more likely they were to understand the DNA evidence, which inherently makes sense. Also, race again proved to be significant. Whites were more likely to understand the scientific evidence presented to them (48.66% White vs. 37.37% all others). Finally, note taking also revealed significance in that if the juror took notes, they were more likely to understand the information before deliberations.

Table 6: Understanding (Pre-Deliberation) as the Dependent Variable

Variable		Understanding (Pre-Deliberation)
Perceived Importance		
	Important	54.79*
	Not Important	37.07
Education		
	Some College or more	51.44*
	High School or less	32.54
	5+ Science/Math Classes	59.69*
	1-4 Science/Math Classes	36.36
Served a Criminal Trial?		
	Yes	48.89
	No	46.26
Gender		
	Male	49.57
	Female	43.44
Race		
	White	48.66*
	All Others	37.37
Job Status		
	Full time Employed	46.80
	All Others	44.96
Note Taking		
	Yes	42.31
	All Others	47.22
Notes + Questions		
	Yes	58.23*
	All Others	44.05
Notes + Check List		
	Yes	41.77
	All Others	47.34
Notes + Notebook		
	Yes	40.00
	All Others	47.72
All Innovations		
	Yes	51.90
	All Others	45.32

(*$p<0.05$)

Similar results and significant variables were found for understanding after deliberation as the dependent variable (Table 7). The more important jurors felt the evidence to be, the more likely they were to understand it (59.62%, post-deliberation) Once again, race played an influential role in a jurors understanding of the DNA evidence after deliberations.

Table 7: Understanding (Post-Deliberation) as the Dependent Variable

	Variable	Understanding (Post-Deliberation)
Perceived Importance		
	Important	59.62*
	Not Important	34.13
Education		
	Some College or more	52.86*
	High School or less	33.33
	5+ Science/Math Classes	61.54*
	1-4 Science/Math Classes	33.76
Served a Criminal Trial?		
	Yes	48.89
	No	47.67
Gender		
	Male	49.13
	Female	46.34
Race		
	White	50.27*
	All Others	38.38
Job Status		
	Full time Employed	47.40
	All Others	48.06
Note Taking		
	Yes	43.75
	All Others	48.48
Notes + Questions		
	Yes	53.16
	All Others	46.60
Notes + Check List		
	Yes	45.00
	All Others	48.23
Notes + Notebook		
	Yes	47.50
	All Others	47.73
All Innovations		
	Yes	51.28
	All Others	46.98

(*$p<0.05$)

The next step of my relative risk analysis uses understanding and importance to take a look at the ultimate decision, jury verdict (Table 8). The more someone felt the DNA evidence was important, the more likely they were to find the defendant guilty (62.8% guilty vs. 37.2% not guilty). This is consistent with my hypothesis and was significant. Also, my results show that if someone felt that they understood the mtDNA evidence well they were more likely to end in a guilty verdict (55.88% guilty vs. 44.12% not guilty: *pre-deliberation*; 55.18% guilty vs. 44.82% not guilty: *post-deliberation*). The results before and after deliberations compared with understanding stayed consistent. Although this variable was not significant, the similarity in the numbers further highlights consistency in juror thoughts. The rest of the subsequent variables in Table 8 relate to juror understanding, juror background as well as note taking, were not significant. The repeated findings that indicate jury consistency help to support Kalven and Zeisel's 1966 findings. They found that jurors are likely to stay consistent in their thinking and their initial thoughts regarding the defendant's guilt is likely to trump any group influences.

Table 8: *Guilty* as the Dependent Variable

	Variable	Guilty
Perceived Importance		
	Important	62.80*
	Not Important	40.31
Understanding		
	Well (Pre-Deliberation)	55.88
	Not Well at All (Pre-Deliberation)	50.20
	Well (Post-Deliberation)	55.81
	Not Well at All (Post-Deliberation)	49.58
Education		
	Some College or more	54.38
	High School or less	47.97
	5+ Science/Math Classes	50.81
	1-4 Science/Math Classes	53.64
Served a Criminal Trial?		
	Yes	54.55
	No	52.32
Gender		
	Male	47.95
	Female	57.02
Race		
	White	54.32
	All Others	46.81
Job Status		
	Full time Employed	51.06
	All Others	56.56
Note Taking		
	Yes	34.18
	All Others	56.53*
Notes + Questions		
	Yes	59.42
	All Others	51.43
Notes + Check List		
	Yes	55.26
	All Others	52.12
Notes + Notebook		
	Yes	52.56
	All Others	52.66
All Innovations		
	Yes	59.74
	All Others	51.19

(*$p<0.05$)

Next, I took a look at the percentage of people who changed or didn't change their thoughts regarding the defendant's guilt or innocence (Table 9). At a quick glance, we can see that the majority of jury members did not change their minds. Other various trends in thought processes were found. Those who felt the mtDNA evidence was important were more likely to stay consistent in their decision-making (64.23% did not change their minds vs. 35.77% who did), leaving little influence for group persuasion. I view these results as a confirmation that the jury members are making reliable decisions since the trial the original study was based on resulted in a guilty verdict. However, chi-square testing found this result between importance and a change a juror's decision to not be significant at the 0.05 level.

Table 9: *Change* as the Dependent Variable

	Variable	No Change
Perceived Importance		
	Important	64.23
	Not Important	60.58
Understanding		
	Well (Pre-Deliberation)	70.00*
	Not Well at All (Pre-Deliberation)	56.13
	Well (Post-Deliberation)	68.72*
	Not Well at All (Post-Deliberation)	56.85
Education		
	Some College or more	65.43*
	High School or less	53.97
	5+ Science/Math Classes	69.90*
	1-4 Science/Math Classes	52.56
Served a Criminal Trial?		
	Yes	65.22
	No	62.24
Gender		
	Male	60.87
	Female	63.82
Race		
	White	63.03
	All Others	60.61
Job Status		
	Full time Employed	64.64
	All Others	56.15
Note Taking		
	Yes	55.00
	All Others	63.89
Notes + Questions		
	Yes	67.09
	All Others	61.46
Notes + Check List		
	Yes	62.50
	All Others	62.37
Notes + Notebook		
	Yes	61.25
	All Others	62.63
All Innovations		
	Yes	65.82
	All Others	61.71

(*$p<0.05$)

When looking at understanding, the more jury members understood the evidence (a rating of seven or higher on the 10 point scale), the more likely they did NOT change their minds (70% no change vs. 30% change: *pre-deliberation*; 56.85% no change vs.

31.28% change: *post-deliberation*). A better overall understanding of DNA evidence led to jury members staying consistent in their views towards the defendant. Also, the more education one had, the more likely they were to not change their mind and stay solid in their initial decision. This was true in both the education level (65.43% no change vs. 34.57% change) and number of science/math classes (69.90% no change vs. 30.10% change) measure. Understanding, education level and number of science/math classes one has taken all proved significant. Lastly, none of the note taking measures had a significant effect on a juror's propensity to change their decision. These findings with regards to change show little impact of group persuasion in jury decision making.

Next I wanted to look at directional changes taking place, so I included variables to measure those who changed their verdict to a guilty one (Table 10). We already know that jury members tend to stay consistent in their thoughts. However, out of those who did change their minds, more jurors changed their minds to not guilty. The propensity to find the defendant not guilty increased when the jury member did not think the evidence was important, didn't understand it, or had less education. Also, this likelihood of believing the defendant to be not guilty was more likely among males, all other races (not white) and all other job statuses (not employed full time). However, with these latter three variables (gender, race and job status) the differences in percentages were very small.

Table 3: *Change to Guilty* as the Dependent Variable

Variable		Did Not Change	Change to Guilty	Change to Not Guilty
Perceived Importance				
	Important	66.53*	18.33	15.14
	Not Important	63.00	13.00	24.00
Understanding				
	Well (Pre-Deliberation)	74.40*	12.56	13.04
	Not Well at All (Pre-Deliberation)	57.03	18.47	24.50
	Well (Post-Deliberation)	71.89*	12.90	15.21
	Not Well at All (Post-Deliberation)	58.51	17.84	23.65
Education				
	Some College or more	68.15*	14.29	17.56
	High School or less	55.28	19.51	25.20
	5+ Science/Math Classes	72.49*	9.52	17.99
	1-4 Science/Math Classes	53.95	20.39	25.66
Served a Criminal Trial?				
	Yes	68.18	13.64	18.18
	No	64.49	15.70	19.81
Gender				
	Male	63.06	16.22	20.72
	Female	66.24	15.19	18.57
Race				
	White	65.29	15.43	19.28
	All Others	63.16	16.84	20.00
Job Status				
	Full time Employed	66.37	14.58	19.05
	All Others	59.84	18.85	21.31
Note Taking				
	Yes	55.70	11.39	32.91
	All Others	66.58*	16.58	16.84
Notes + Questions				
	Yes	73.61	16.67	9.72
	All Others	63.05	15.50	21.45
Notes + Check List				
	Yes	64.94	16.88	18.18
	All Others	64.66	15.45	19.90
Notes + Notebook				
	Yes	62.82	15.38	21.79
	All Others	65.09	15.75	19.16
All Innovations				
	Yes	67.53	16.88	15.58
	All Others	64.14	15.45	20.42

(*$p<0.05$)

Level of importance proved to be significant in this model, showing the more important a juror thought the DNA was, the more likely they were to change and stick with a guilty verdict (18.33% change to guilty vs. 15.14% change to not guilty). This shows that the more important jury members felt the evidence was, although most did not change their opinions (66.53%), the more likely they changed their mind was to a guilty verdict. When looking at understanding, slightly more jury members changed their minds to a not guilty verdict (13.04 changed to not guilty vs. 12.56 changed to guilty). Again, if you did understand the mtDNA evidence, you didn't change your mind at all. There was a slight increase in this difference when looking at those whose understanding was high after deliberations (15.21% vs. 12.90%).

Similar to the previous table's results, significance was shown with both educational measures, with a likelihood of believing the defendant to be not guilty. However, as mentioned above, these discrepancies are further amplified when the education levels decreased. Although there was a propensity to find the defendant guilty, these results show little group influence as well as a higher probability in unreliable (or not guilty) outcomes when jury members do not understand the testimony.

Chapter 5: Discussion

Although the findings are mixed when it comes to addressing my hypothesis, there are some positive conclusions I can draw from this study. When addressing research question #1 and #2, it seems that my hypotheses are confirmed in that one's perceived importance and understanding of presented scientific data significantly affects one's propensity to find someone guilty. Since "guilty" was the outcome for the defendant in the trial this data was based off of, that is considered a correct response and a reliable outcome in this case. Also, if someone has not served on a criminal trial before, they were more likely to find the defendant guilty (the majority, 432 people, have never served on a criminal trial before). By exploring what influences importance and understanding and then in turn looking at how these variables affect guilty votes, the reliability of the conclusions is increased.

One's education and age also showed to have a significant impact on whether a juror believed the mtDNA was important or if they understood it at all. Two unexpected results include in the post-jury deliberation output one's job status showed a significant effect as well as an effect emerging between one's perceived importance and their race. Racial effects emerged from both the bivariate and multivariate analyses. This could be correlated with the face that citizens need to be registered to vote to be called for jury duty. Lower class neighborhoods consist of high African American populations and are unlikely to be registered to vote, therefore being systematically excluded from a jury sample (Fukurai, 1996). Little minority participation can also be possibly explained by those who cannot afford to miss days of work are usually dismissed from jury duty.

Knowing that importance and understanding play such an important role to the decision making process is important. The results show higher perceived importance and better understanding more often led to a "correct" decision. If the majority of jurors in an actual case do not think the information is important or do not understand it, there is a higher propensity for error. It is important for the prosecution and defense to convey their information as clearly as possible to ensure better results.

In the end of this study, the majority of juries found the defendant not guilty, an incorrect response according to this study. This could be for a few reasons. For the purposes of understanding the impact of learning tools, the research manipulated probability and information from the original trial to make the mtDNA evidence a more important player to the decision making process, but more ambiguous as a result. Also, although the majority of jury members reported they understood the mtDNA evidence, this is a presumptive measure, so we do not know for sure exactly how well they actually understood the data. Overall, it is still important to know what affected the decision to reach a "correct" outcome, and perceived importance and understanding turned out to be influential.

For research question #3, some findings were contrary to my hypothesis including the importance of group effects on the decision-making process. Little changes were found before and after deliberation when it came to analyzing the relative risk of each outcome. This shows little group effects on juror opinions, supporting Kalven and Zeisel's notion that nine out of ten jurors stick with their initial feeling regarding the defendant. This study helps to understand what affects those initial thoughts. They say cases are won and lost in opening statements; this finding helps support that notion.

One caveat to this finding is the lack of "real world pressure" which Dann, Hans and Kaye use to explain some of their findings which are mentioned below. Little group influences could have emerged because of this lack of pressure and may have tended to go with the majority. If this were a real trial situation, an uncomfortable juror may say something because of the consequences and a defendant's future at stake.

There are some methodological concerns that should be noted regarding the original study this research was based on. The researchers account for any discrepancies by the lack of "real world pressure" in the situation. Additionally, since jury members did not have real consequences for not coming to a unanimous decision, the third outcome of 'hung jury' occurred 23% of the time. This concern often comes up during mock jury analysis but it is the only way we as social scientists can begin to understand what occurs behind closed doors. The experimental design of this study also hinders the reliability and external validity of the findings because participants were not able to treat this situation realistically (Dann, Hahn & Kaye, 2004).

Dann, Hahn and Kaye (2004) also addressed concerns of validity in their original design. They sought to determine if the mock juries were significantly different from the volunteer jury population. They were able to conclude through chi-square testing that the two populations were very similar except with respect to educational background. People with only high school degrees were more likely to take part in the study than those with college degrees (Dann, Hahn & Kaye, 2004). They determined this was possibly due to the monetary incentive ($50.00) or because of a discrepancy in the surveys given to the volunteers and the final subjects. This may hinder the generalizability of my findings because it is possible that those who volunteered are inherently different from those who

had no interest in participating. The response categories regarding education differed between surveys in that there was an overlap for those who took *some* college classes but had yet to obtain a degree ("Highest level of education completed" vs. "How many years of education completed?"). This hurts the generalizability of their findings because they simply do not know how different the jury pool and the mock juries were from each other with regards to education (Dann, Hahn & Kaye, 2004).

My study has some weaknesses as well. There were some items that had low response rates, making it hard to get a complete picture. Also, understanding, although unique variable in that it was asked both before and after deliberation is very subjective. Just because one believes they understand information, does not mean they *really* understand it. It is human nature to inflate answers when talking about yourself, and this study is likely no exception.

Additionally, there are validity concerns regarding the sample itself. Since the sample of mock jurors who took part in the survey was selected randomly, my findings could be applied to future *criminal* proceedings that utilize DNA testimony. Conclusions regarding other types of trials utilizing scientific evidence cannot be included in the discussion of findings. However, it is important to see that one's importance and understanding of mtDNA evidence has an impact on their propensity to find someone guilty. I recommend further research into this area of jury information processing to perhaps shape guidelines of how DNA evidence should be used in criminal court needs to be addressed.

Another concern is that those who were eligible for jury-duty, and in turn were included in this study, may differ in certain ways from those who are unable to be

involved. This has been found in the past with race and class differences and their decreased likelihood of being selected for jury duty. This may be due to an inability to miss work or sometime minorities are excluded because of previous criminal records (Fukurai, 1996). This possible difference in populations hinders external validity. Additionally, those who volunteered could be inherently different from those who were not interested (those who participated may have had the time or wanted the monetary incentive).

It is important to remember that just because in this case, the result was a guilty verdict, it does not mean "guilty" is always a "right" answer. Keeping in mind that it is always important for jury members to make the best decision they can, being careful not to misuse or assume information. This study shows that it is important to understand evidence in order to make better decisions. Some of this finding was driven by the innovations portion of this study, but not a large amount.

Finally, the study was an experimental design, utilizing randomization for selection from the target population. No voir dire was conducted to tailor the jury to the case. Voir dire is where potential jury members are selected before hand to see if they are suitable to sit on the jury for the defendant. This makes real-life jury selection is anything *but* random. True jury selection conducts voir dire to consider factors such as scientific background in the process of findings potential candidates. For example, it may be likely that one with a significant science background would be excluded from jury consideration because their knowledge may act as an advantage for one side of a case. There is a possible disconnect between randomized (experimental) and non-

randomized (true jury selection). The process of jury selection and the factors involved should be considered when attempting to draw conclusions from my findings.

Conclusion

By understanding the influential factors used in the jury decision-making process, legal strategies could be modified accordingly. DNA evidence may be overemphasized or too confusing for "lay-people" to understand. Jurors may also be biased in their opinions about DNA evidence due to their educational and personal background. All of these concerns need to be addressed in order to maintain the integrity of the trial process. If DNA is shown to play a major role in juror's perception of guilt, then it is imperative to understand the thought processes of the jury. Prosecution and defense teams need to be aware of possible influences in order to better address their respective case. Furthermore, it is essential that DNA evidence is presented in a manner that maximizes juror comprehension, for the sake of all those involved.

Age and gender proved to have an effect on a jury member's perceived importance and understanding (both before and after deliberation) of mtDNA evidence. In turn, their perceived importance and understanding had an effect on the propensity to find the defendant guilty. The more jurors thought the information presented to them was important, and the more they understood it, the more likely they were to find the defendant guilty. A juror's education showed to have an influential effect on their perceived importance and understanding of the mtDNA evidence. An unexpected result is the emergence of race as a significant variable. There are possible societal explanations for this finding, such as systematic exclusion from jury duty and distrust in the criminal justice system. Other tested factors such as having never been on a criminal trial before also had an impact, although not as great.

Additionally, group effects were slight if at all, supporting Kalven and Zeisel's 1966 argument that once jurors come up with their personal opinions regarding the defendant, they are likely to stick to these thoughts. However, it is important to remember that this study utilized mock jurors and therefore the lack of "real world pressure" may have led jurors to feel they do not have to reach a final decision (and thus perhaps attributing to numerous hung juries or highly consistent thoughts their verdict).

Regardless of how scientific evidence is presented, it is crucial to the conceptualization, reliability and validity of a case. Some cases are constructed around scientific information alone. This is why it is important for juries to properly understand presented testimony. Through this study, I have helped to address some of these concerns. In the end, scientific evidence is being presented in a venue where comprehension is required and justice is imperative. As Jasonoff argues, "[The] common law trial is not purely and simply a search for the truth: it is, more accurately, a contest of credibility between two carefully packaged, competing accounts of the 'same' reliability" (1998, 731).

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